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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ASHLEY STEVENS, ELVIND LILAND, DAREN CROXFORD, and JOE TAPPLY

Appeal 2016-005281
Application 12/588,461[1]
Technology Center 2600

Before ELENI MANTIS MERCADER, JENNIFER L. McKEOWN, and CATHERINE SHIANG, *Administrative Patent Judges*.

McKEOWN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1, 3, 4, 7, 8, 11, 13, 14, 17, 18, 21, 23, 26, 27, and 30–34. Claims 2, 5, 6, 9, 10, 12, 15, 16, 19, 20, 22, 24, 25, 28, and 29 have been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] The real party in interest is ARM Limited.

STATEMENT OF THE CASE

Appellants' invention is directed to

> A graphics processing system include[ing] a graphics processor 1 that renders output frames that are written to a frame buffer in a memory 2 for display on a display 7. Comparison and control hardware 5 of the graphics processing system operates to compare successive output frames that are being generated for display, and then controls one or more aspects of the way in which the display of the output frames generated by the graphics processor 1 is carried out.

Abstract. Spec., ll. 4–6.

Claim 1 is illustrative and is reproduced below:

> 1. A method of operating a data processing system in which a stream of output frames to be displayed is generated by the data processing system and written to a frame buffer for display on a display device local to the frame buffer, the method comprising:
>
> the data processing system generating a stream of output frames to be displayed; and
>
> writing the frames to the frame buffer;
>
> the data processing system, for plural output frames of a sequence of output frames, comparing a newly generated output frame to be written to the frame buffer with an output frame that is currently stored in the frame buffer to obtain a measure of correlation for the sequence of output frames;
>
> controlling at least one aspect of the way in which the output frames are provided for display on the display device local to the frame buffer on the basis of the obtained measure of correlation for the sequence of output frames,
>
> wherein the step of comparing the output frames to be displayed comprises comparing blocks of data representing particular regions of the respective output frames with each other, and the data processing system is a tile-based graphics processing system and each data block that is compared corresponds to a rendered tile that the graphics processing system produces,

> wherein the number of data blocks determined to match or to mismatch between the newly generated output frame and the output frame that is currently stored in the frame buffer based on the comparison is used as the measure of correlation for the sequence of output frames,
>
> wherein the controlling comprising at least one of:
>
> altering the number of frames per second at which frames are read from the frame buffer and provided to the display device to refresh the display device on the basis of the obtained measure of correlation for the sequence of output frames; and
>
> controlling the way that the output frame is stored in the frame buffer by selecting the format in which the frame is stored in the frame buffer from a lower quality format and a higher quality format on the basis of the obtained measure of correlation for the sequence of output frames.

THE REJECTIONS[2]

Claims 1, 4, 7, 11, 14, 17, 21, 23, 26 and 30–34 are rejected under 35 U.S.C. § 103(a) as unpatentable over Lee (US 2006/0152515 A1; pub. July 13, 2006), Hayon (US 2008/0002894 A1; pub. Jan. 3, 2008), and Greene (US 8,254,685 B2; iss. Aug. 28, 2012). Final Act. 8–17.

Claims 3 and 13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Lee, Hayon, Greene, and Hollevoet (US 2007/0188506 A1; pub. Aug. 16, 2007). Final Act. 18.

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[2] We note that the Final Action rejects claims 19, 20, 28, 29 and 31 under 35 U.S.C. § 112 (pre-AIA), 4th paragraph. *See* Final Act. 8. However, Appellants' Amendment, dated July 17, 2015, which was entered by the Examiner (*see* Advisory Action dated July 29, 2015), cancels claims 19, 20, 28, and 29 and amends claim 31 to depend from claim 1 instead of canceled claim 9. As such, we understand the Examiner inadvertently included this rejection under 35 U.S.C. § 112 (pre-AIA), 4th paragraph and we find this error harmless.

Claims 8, 18, and 27 are rejected under 35 U.S.C. § 103(a) as unpatentable over Lee, Hayon, Greene, and Pierini (US 7,671,873 B1; iss. Mar. 2, 2010). Final Act. 18–19.

ANALYSIS

THE OBVIOUSNESS REJECTION BASED ON LEE, HAYON, AND GREENE

Claims 1, 4, 7, 11, 14, 17, 21, 23, 26 and 30–34

Based on the record before us, we are not persuaded that the Examiner erred in rejecting claims 1, 4, 7, 11, 14, 17, 21, 23, 26 and 30–34.

Appellants argue that Lee fails to teach or suggest "the data processing system, for plural output frames of a sequence of output frames, comparing a newly generated output frame to be written to the frame buffer with an output frame that is currently stored in the frame buffer to obtain a measure of correlation for the sequence of output frames," as recited in claim 1. App. Br. 14–15.

Appellants maintains that there is no direct comparison of the current frame with the previous frame in Lee and, as such, Lee cannot teach comparing a newly generated output frame to be written to the frame buffer with an output frame that is currently stored in the frame buffer. App. Br. 15; Reply Br. 3. According to Appellants, Lee uses a "dirty bit" to detect the update areas. For example, Appellants assert that

> It is well-known in the graphics processing art that a dirty bit is set when a block of memory associated with the dirty bit is written to (modified) by a processor. There is no direct comparison between the newly-written data and the previously-

> stored data, which involves examining the actual content of the data.

App. Br. 16.

Notably absent, though, is any persuasive support for this argument. For example, Appellants fail to identify any supporting disclosure of Lee or extrinsic evidence to support use of the alleged "dirty bit." To the contrary, Lee describes that, prior to the generation of the DPVL packet, "a host controller [] detect[s] a plurality of update areas corresponding to the video data of a current frame changed from a previous frame." Ans. 2 (citing Lee Abstract); *see also* Ans. 3 (citing Lee ¶ 37); Lee ¶¶ 9, 15, 19, 37, 54, Fig. 5 (labeling step 310 as detecting plural update areas). As the Examiner further explains, Lee's disclosures at least suggest to a skilled artisan that the current and previous image frames would be compared to detect the data changes. *See* Final Act. 3. As such, we are not persuaded that the Examiner erred in finding that Lee teaches or suggests comparing a newly generated output frame to be written to the frame buffer with an output frame that is currently stored in the frame buffer.

Next, Appellants assert that Hayon does not "obtain a measure of correlation for the sequence of output frames," as required by claim 1. App. Br. 19. Specifically, Appellants contend that there is no teaching or suggestion that Hayon's outputted "indication" of changed files, or any of the other examples in Hayon, are a measure of correlation for a sequence of output frames. App. Br. 19; Reply Br. 3–4.

We find Appellents' argument unavailing. Claim 1, as well as the Specification, describes a measure of correlation as merely whether successive frames are the same or similar. *See* claim 1 ("the number of data blocks determined to match or to mismatch between the newly generated

output frame and the output frame that is currently stored in the frame buffer based on the comparison is used as the measure of correlation for the sequence of output frames"); Spec., p. 18 ll. 24–26 ("the number of data blocks found to match or to mismatch in the two output frames being compared is used as a measure of the correlation of the frames); Spec. p. 12, ll. 1–10 (explaining that the comparison process is to assess correlation between successive and/or sequences of output frames and determining whether one frame is the same or similar to another).

Hayon similarly teaches "[a]n indication of changed tiles in the second image with respect to the first image." Hayon Abstract; *see also* Hayon ¶ 15. In other words, Hayon's indication identifies a number of mismatched tiles. Moreover, as the Examiner explains, "[t]he claim language 'a measure of correlation' can refer to any relationship of two image frames, i.e. same, similar, very similar, tiny different, very different etc." Ans. 4; *see also* Spec. p. 12, ll. 1–10. As such, Appellants fail to persuasively explain why Hayon's indication does not satisfy the recited claim limitation.

Appellants further emphasize that the measure of correlation is for a *sequence* of plural output frames. *See* Reply Br. 4; App. Br. 19–20. However, as discussed above, Hayon indicates the changed tiles in the second image with respect to the first image. Hayon indication, then, is for a sequence of plural output frames, i.e. a first and second output frame. Moreover, a skilled artisan would understand, given that Hayon is directed to video frames, Hayon would not be limited to only a first and second image frame but would continue the described process for successive image

frames. As such, we are not persuaded that Hayon fails to teach or suggest the recited measure of correlation for a *sequence* of plural output frames.

We also find Appellants' arguments with respect to Greene unpersuasive. Appellants, in particular, allege that

> Although Greene discloses a low quality format for a changed image and high quality format for a [sic] unchanged image, Greene's control is not based on a measure of correlation for a sequence of frames as defined in claim 1, i.e., number of matching or mismatching data blocks. None of Greene's "different algorithms" discloses or suggests the claimed measure of correlation.

App. Br. 24; *see also* Reply Br. 4–5.

Greene, however, teaches detecting content change between a new image and a previous image and increasing or decreasing image quality based on the detected content change. Ans. 5 (citing Greene col. 10, ll. 13–40 and Fig. 3); *see also* Fig 3 (showing (in steps 310, 314, and 315) that image quality may increase or decrease based on content change of an image). Greene expressly describes the image comparison may include an indication of *change, no change or a degree or amount of change between a new image and a previous image*. Greene col. 10, ll. 17–20. And that the image quality may be increased or decreased based on this indication. Greene, col. 10, ll. 20–40. As such, Appellants have not shown how Greene's indication of change, no change or degree or amount of change does not satisfy the recited measure of correlation.

Likewise unavailing is Appellants' emphasis on a *sequence* of output frames. As discussed above with respect to Hayon, Greene compares and indicates change between a new and previous image, i.e. a sequence of output frames. Moreover, Greene, like Hayon, is directed to "a streaming

image system" and, as such, a skilled artisan would understand the process to be performed for a sequence of plural output frames. Thus, we are not persuaded that Greene fails to teach or suggest the disputed limitation.[3]

Finally, Appellants make blanket assertions that each of the cited references fails to teach or suggest certain limitations. For example, Appellants list various limitations that are supposedly absent from Lee. *See* App. Br. 18; *see also* App. Br. 20 (listing limitations alleged absent from Hayon). These conclusory assertions, without any persuasive explanation or support, are unpersuasive. *See, e.g.*, 37 C.F.R. § 41.37(c)(1)(iv) ("A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim.").

Accordingly, we sustain the rejection of claim 1, as well as claims 4, 7, 11, 14, 17, 21, 23, 26, and 30–34 not argued with particularity, as unpatentable over Lee, Hayon, and Greene.

THE REMAINING OBVIOUSNESS REJECTIONS

Claims 3, 8, 13, 18, and 27

Appellants do not separately argue the patentability of claims 3, 8, 13, 18, and 27, and instead rely on the arguments presented for claim 1. *See, e.g.*, App. Br. 25. For the reasons discussed above, we are not persuaded that the Examiner erred in rejecting these claim 1. Accordingly, we sustain

[3] We note, as the Examiner did, that the claims require the controlling to comprise "at least one of" the limitations of altering or controlling the way the frame is stored. Ans. 4–5. Because we agree with the Examiner that Greene teaches or suggests the controlling the way the frame is stored limitation, we need not address whether Hayon teaches or suggests the altering limitation.

the Examiner's rejection of claims 3, 8, 13, 18, and 27 as unpatentable over the cited combinations of prior art.

DECISION

The Examiner's decision rejecting claims 1, 3, 4, 7, 8, 11, 13, 14, 17, 18, 21, 23, 26, 27, and 30–34 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED